

Ravi Chugh | CV

Crerar Library 345, University of Chicago, 5730 S Ellis Ave, Chicago, IL 60637

✉ rchugh@cs.uchicago.edu • 🌐 <https://people.cs.uchicago.edu/~rchugh>

Research Interests

Programming Languages, Human-Computer Interaction

Functional Programming, Program Synthesis, Structure Editors, Graphical User Interfaces

Teaching Interests

Computer Programming

Functional Programming, Creative Coding, Introductory Computer Science

Appointments

University of Chicago, Chicago, IL

Director of Undergraduate Studies, Department of Computer Science

Associate Professor, Department of Computer Science

Assistant Professor, Department of Computer Science

2014 – present

2023 – present

2021 – present

2014 – 2021

University of California, San Diego, La Jolla, CA

Postdoctoral Scholar

Graduate Student Researcher and Teaching Assistant

2007 – 2014

2013 – 2014

2007 – 2013

Mozilla, San Francisco, CA

Research Intern

2012

Microsoft, Redmond, WA

Program Manager Intern, Software Design Engineer Intern, Research Intern

2005, 2006, 2009

University of Pennsylvania, Philadelphia, PA

Undergraduate Teaching Assistant

2004 – 2007

Education

University of California, San Diego, La Jolla, CA

Ph.D., Computer Science

Dissertation Title: “Nested Refinement Types for JavaScript”

Dissertation Advisor: Ranjit Jhala

2013

University of Pennsylvania, Philadelphia, PA

Master of Science in Engineering (MSE), Computer Science

Bachelor of Science in Engineering (BSE), Computer Science

Graduated summa cum laude.

2007

Conference and Journal Publications

2023

Projectional Editors for JSON-Based DSLs

VL/HCC 2023

Andrew McNutt and Ravi Chugh

Visual Languages and Human-Centric Computing

Washington, DC, October 2023

A Study of Editor Features in a Creative Coding Classroom

CHI 2023

Andrew McNutt, Anton Outkine, and Ravi Chugh

Human Factors in Computing Systems

Hamburg, Germany, April 2023

2022

Maniposynth: Bimodal Tangible Functional Programming

ECOOP 2022

Brian Hempel and Ravi Chugh

European Conference on Object-Oriented Programming

Berlin, Germany, June 2022

2021

Filling Typed Holes with Live GUIs

PLDI 2021

Cyrus Omar, David Moon, Andrew Blinn, Ian Voysey, Nick Collins, and Ravi Chugh

Programming Language Design and Implementation

Virtual Conference, June 2021

Integrated Visualization Editing via Parameterized Declarative Templates

CHI 2021

Andrew McNutt and Ravi Chugh

Human Factors in Computing Systems

Virtual Conference, May 2021

2014 – 2020

Program Sketching with Live Bidirectional Evaluation

ICFP 2020

Justin Lubin, Nick Collins, Cyrus Omar, and Ravi Chugh

Proceedings of the ACM on Programming Languages (PACMPL), Issue ICFP

~~Jersey City, NJ~~, Virtual Conference, August 2020

Tiny Structure Editors for Low, Low Prices! (Generating GUIs from toString Functions)

VL/HCC 2020

Brian Hempel and Ravi Chugh

Visual Languages and Human-Centric Computing

~~Dunedin, New Zealand~~, Virtual Conference, August 2020

Sketch-n-Sketch: Output-Directed Programming for SVG

UIST 2019

Brian Hempel, Justin Lubin, and Ravi Chugh

User Interface Software and Technology

New Orleans, LA, October 2019

Live Functional Programming with Typed Holes

POPL 2019

Cyrus Omar, Ian Voysey, Ravi Chugh, and Matthew A. Hammer

Proceedings of the ACM on Programming Languages (PACMPL), Issue POPL

Lisbon, Portugal, January 2019

Bidirectional Evaluation with Direct Manipulation

OOPSLA 2018

Mikaël Mayer, Viktor Kunčák, and Ravi Chugh

Proceedings of the ACM on Programming Languages (PACMPL), Issue OOPSLA

Boston, MA, November 2018

Deuce: A Lightweight User Interface for Structured Editing

ICSE 2018

Brian Hempel, Justin Lubin, Grace Lu, and Ravi Chugh

International Conference on Software Engineering

Gothenburg, Sweden, May 2018

Conference and Journal Publications (continued)

2014 – 2020 (continued)

Semi-Automated SVG Programming via Direct Manipulation UIST 2016

Brian Hempel and Ravi Chugh

User Interface Software and Technology

Tokyo, Japan, October 2016

Featured in “Research for Practice,” *ACM Queue* (Jan/Feb 2017) and *CACM* (Jul 2017)

Programming and Direct Manipulation, Together at Last PLDI 2016

Ravi Chugh, Brian Hempel, Mitchell Spradlin, and Jacob Albers

Programming Language Design and Implementation

Santa Barbara, CA, June 2016

Prodirect Manipulation: Bidirectional Programming for the Masses ICSE-C 2016

Ravi Chugh

International Conference on Software Engineering Companion, Visions of 2025 and Beyond (V2025)

Austin, TX, May 2016

IsoLate: A Type System for Self-Recursion ESOP 2015

Ravi Chugh

European Symposium on Programming

London, UK, April 2015

2007 – 2013

Dependent Types for JavaScript OOPSLA 2012

Ravi Chugh, David Herman, and Ranjit Jhala

Object-Oriented Programming Systems, Languages, and Applications

Tucson, AZ, October 2012

Nested Refinements: A Logic for Duck Typing POPL 2012

Ravi Chugh, Patrick M. Rondon, and Ranjit Jhala

Principles of Programming Languages

Philadelphia, PA, January 2012

Type-Preserving Compilation for End-to-End Verification of Security Enforcement PLDI 2010

Juan Chen, Ravi Chugh, and Nikhil Swamy

Programming Language Design and Implementation

Toronto, Canada, June 2010

Enforcing Stateful Authorization and Information Flow Policies in Fine ESOP 2010

Nikhil Swamy, Juan Chen, and Ravi Chugh

European Symposium on Programming

Paphos, Cyprus, March 2010

Staged Information Flow for JavaScript PLDI 2009

Ravi Chugh, Jeffrey A. Meister, Ranjit Jhala, and Sorin Lerner

Programming Language Design and Implementation

Dublin, Ireland, June 2009

Dataflow Analysis for Concurrent Programs using Datarace Detection PLDI 2008

Ravi Chugh, Jan W. Voong, Ranjit Jhala, and Sorin Lerner

Programming Language Design and Implementation

Tucson, AZ, June 2008

Workshop Publications

- Type-Directed Program Transformations for the Working Functional Programmer** PLATEAU 2019
Justin Lubin and Ravi Chugh
Workshop on Evaluation and Usability of Programming Languages and Tools
New Orleans, LA, October 2019
- A Bidirectional Krivine Evaluator** Bx 2019
Mikaël Mayer and Ravi Chugh
International Workshop on Bidirectional Transformations
Philadelphia, PA, June 2019

Unpublished Workshop Papers and Manuscripts

- Delta Dictionaries: Total and Extensional Finite Maps in Proof Assistants** Manuscript, 2020
Nick Collins, Ian Voysey, and Ravi Chugh
September 2020
- Livelits: Filling Typed Holes with Live GUIs (Extended Abstract)** TyDe 2019
Cyrus Omar, Nick Collins, David Moon, Ian Voysey, and Ravi Chugh
Workshop on Type-Driven Development
Berlin, Germany, August 2019
- Predicting Haskell Type Signatures From Names** Manuscript, 2018
Bowen Wang, Brian Hempel, and Ravi Chugh
September 2018
- Direct Manipulation Programming Systems (A Brief Introduction)** White Paper, 2017
Ravi Chugh
ISAT/DARPA “Augmented Developers: Tools for Hybrid Man-Machine Software Engineering” Workshop
Arlington, VA, February 2017
- A Fix for Dynamic Scope** ML 2013
Ravi Chugh
ACM Workshop on ML
Boston, MA, September 2013
- Status Report: Dependent Types for JavaScript** STOP 2012
Ravi Chugh, David Herman, and Ranjit Jhala
Workshop on Script to Program Evolution
Beijing, China, June 2012
- Type Inference with Run-time Logs** STOP 2011
Ravi Chugh, Ranjit Jhala, and Sorin Lerner
Workshop on Script to Program Evolution
Austin, TX, January 2011

Fun, Funky, Functional: The Pursuit of Better User Interfaces for Programming

ICFP 2021 Keynote

Recorded August 2021

Reimagining the User Interfaces for Programming

University of Iowa

January 28, 2022

Strumenta, Virtual Meetup

September 16, 2021

University of Louisiana, Lafayette

March 26, 2021

Microsoft Research, Cambridge

March 17, 2021

University of Chicago

October 2, 2020

Everyday Coding with Graphical User Interfaces

Illinois Ignite, ~~Chicago, IL~~

Recorded August 27, 2020

Sketch-n-Sketch

Future of Coding Podcast, Episode 49 (March 2021)

Recorded January 29, 2020

Bidirectional Programming with Direct Manipulation

Princeton University, Princeton, NJ

November 8, 2019

University of Pennsylvania, Philadelphia, PA

November 7, 2019

Purdue University, West Lafayette, IN

October 16, 2019

University of California, Los Angeles, CA

October 11, 2019

University of California, San Diego, CA

October 9, 2019

University of California, Berkeley, CA

October 8, 2019

Carnegie Mellon University, Pittsburgh, PA

September 4, 2019

Northwestern University, Evanston, IL

May 22, 2019

Programming with Direct Manipulation in Sketch-n-Sketch: Three Years, Three Ideas

PLATEAU Keynote, Boston, MA

November 5, 2018

Direct Manipulation Programming in Sketch-n-Sketch

ICFP Tutorials, St. Louis, MO (with Collins, Hempel, Lubin, and Mayer)

September 27, 2018

Structured Editing for Elm* in Elm

elm-conf, St. Louis, MO

September 26, 2018

Direct Manipulation Programming Systems

SPLASH-I, Vancouver, Canada

October 25, 2017

University of Wisconsin, Madison, WI

June 5, 2017

University of Maryland, College Park, MD

February 20, 2017

University of Washington, Seattle, WA

January 11, 2017

Interactive SVG Programming with Direct Manipulation

Strange Loop, St. Louis, MO

September 17, 2016

Prodirect Manipulation: Bidirectional Programming for the Masses

ICSE, Austin, TX

May 19, 2016

Program Synthesis for Direct Manipulation Interfaces

MIT, Cambridge, MA

March 1, 2016

Harvard University, Cambridge, MA

February 29, 2016

ECOOP PC Meeting, Brown University, Providence, RI

February 28, 2016

PADL Invited Talk, St. Petersburg, FL

January 18, 2016

Midwest PL Summit, West Lafayette, IN

December 4, 2015

IsoLate: A Type System for Self-Recursion

ESOP, London, UK

April 14, 2015

Late Typing for Loosely Coupled Recursion

Dagstuhl, "Foundations of Scripting Languages," Wadern, Germany

June 30, 2014

Modern Type Systems for Dynamic Languages

Samsung Research, San Jose, CA	April 22, 2014
Purdue University, West Lafayette, IN	April 17, 2014
Swarthmore College, Swarthmore, PA	March 28, 2014
University of Chicago, Chicago, IL	March 14, 2014

A Fix for Dynamic Scope

OOPSLA PC Meeting, UCLA, Los Angeles, CA	May 14, 2014
ML Workshop, Boston, MA	September 22, 2013

Nested Refinement Types for JavaScript

Northeastern University, Boston, MA	September 30, 2013
University of California, San Diego, CA (Dissertation Defense)	September 3, 2013
University of California, San Diego, CA (Thesis Proposal)	November 16, 2011

Static Verification for Web Scripting Languages

University of Washington, Seattle, WA	April 18, 2013
Microsoft Research, Cambridge, UK	April 9, 2013
Microsoft Research, Redmond, WA	April 3, 2013
University of Texas, Austin, TX	March 19, 2013
IBM Research, Yorktown Heights, NY	March 14, 2013
University of Michigan, Ann Arbor, MI	February 28, 2013
Georgetown University, Washington, DC	February 25, 2013
Oregon State University, Corvallis, OR	February 13, 2013

Refinement Types for JavaScript Security

Brown University, Providence, RI	January 28, 2013
Rutgers University, New Brunswick, NJ	January 23, 2013

Dependent Types for JavaScript

HCSS, Annapolis, MD	May 7, 2013
SoCal, Riverside, CA	November 30, 2012
OOPSLA, Tucson, AZ	October 24, 2012
Dagstuhl, "Web Application Security," Wadern, Germany	October 2, 2012
JSTools, Beijing, China	June 13, 2012
STOP, Beijing, China	June 11, 2012

Nested Refinements: A Logic for Duck Typing

POPL, Philadelphia, PA	January 26, 2012
Dagstuhl, "Foundations of Scripting Languages," Wadern, Germany	January 4, 2012
SoCal, La Jolla, CA	December 3, 2011

Type Inference with Run-time Logs

STOP, Austin, TX	January 29, 2011
Kyoto University, Kyoto, Japan	January 17, 2011
SoCal, Los Angeles, CA	December 4, 2010

Fine + DCIL: End-to-end Verification of Security Enforcement

Microsoft Research, Redmond, WA	August 7, 2009
---------------------------------	----------------

Staged Information Flow for JavaScript

PLDI, Dublin, Ireland	June 16, 2009
-----------------------	---------------

Teaching Experience

University of Chicago

Undergraduate Courses

CMSC 11111: Creative Coding	Spring 2021, Winter 2022
CMSC 14200: Introduction to Computer Science II	Spring 2024
CMSC 16100: Honors Introduction to Computer Science I	Fall 20{14, 15, 16, 17, 18, 20, 21}
CMSC 22300: Functional Programming	Winter 2023, Fall 2023
CMSC 22300: Functional Programming	Winter 20{15, 16}, Spring 20{17, 19, 20}, Winter 2021

High School Courses — Pre-College Immersion

Introduction to Creative Coding	Summer 20{21, 22, 23}
---------------------------------	-----------------------

High School Courses — Collegiate Scholars Program

Art with Science: Creative Coding	Summer 2021
-----------------------------------	-------------

Graduate Courses

CMSC 32001: Topics in Programming Languages	
User Interfaces for Programming	Spring 2020, Winter 2022, Spring 2023, Winter 2024
Bidirectional Programming and Synthesis	Spring 2019
Direct Manipulation Programming	Spring 2018
Program Synthesis	Spring 20{16, 17}
Types and Contracts	Spring 2015

University of California, San Diego

Undergraduate Courses

CSE 130: Programming Languages: Principles and Paradigms	Winter 2014
--	-------------

University of Pennsylvania

Undergraduate Courses

CSE 399-005: C# Programming (unofficial instructor)	Spring 2007
---	-------------

High School Courses — Summer Academy in Applied Science & Tech.

Hardware and Software Algorithms (co-instructor)	Summer 2007
--	-------------

Mentoring Experience

Current Ph.D. Student Advisees

Sam Cohen	2022 – present
-----------	----------------

Former Graduate Student Advisees

Brian Hempel	Tangible Values with Text: Explorations of Bimodal Programming (Ph.D.)	2015 – 2022
Nick Collins	Delta Dictionaries: Total and Extensional Finite Maps in Proof Assistants (MS)	2018 – 2021
Andrew McNutt	Understanding and Enhancing JSON-Based DSL Interfaces for Vis. (Ph.D.)	2020 – 2023

Former Postdoctoral Advisees

Mikaël Mayer	2017 – 2020
Cyrus Omar	2017 – 2019

Former Undergraduate Student Advisees

Jacob Albers		2015
Grace Lu	Deuce: Direct Manipulation Source Program Editor (BS Thesis)	2017
Justin Lubin	Forging Smyth: Program Sketching with Live Bidirectional Eval. (BS Thesis)	2017 – 2020
Izaak Meckler	Mote: Goal-Driven Development and Synthesis for Haskell (BS Thesis)	2015
Anton Outkine		2021 – 2022
Eri Rogers		2017
Bhakti Shah		2022
Amy Sitwala		2016
Mitchell Spradlin		2015
Bowen Wang	Predicting Haskell Type Signatures from Names (BS/MS Thesis)	2015 – 2018
Chris Winkler		2018
John Zhao		2016

Student Awards

Andrew McNutt	Siebel Scholars	2022
Justin Lubin	NSF Graduate Research Fellowship (GRFP)	2020
Brian Hempel	UIST Best Demo Honorable Mention	2019

Student Career Paths

Cyrus Omar	Postdoc 2019 → Assistant Prof. @ Univ. of Michigan
Mikaël Mayer	Postdoc 2020 → CTO @ Tharzen (startup) → Amazon
Justin Lubin	BS 2020 → Ph.D. @ UC Berkeley
Brian Hempel	Ph.D. 2022 →* Postdoc @ UC San Diego
Andrew McNutt	Ph.D. 2023 → Postdoc @ Univ. of Washington → Assistant Prof. @ Univ. of Utah

Professional Service

Organizing Committees

Programming Language Design and Implementation (Sponsorship Co-chair)	PLDI 2022
Programming Language Design and Implementation (Sponsorship Co-chair)	PLDI 2021
Systems, Programming, Languages and Applications: Software for Humanity (Local Chair)	SPLASH 2020
Workshop on Synthesis (Co-chair)	SYNT 2020
Programming Language Design and Implementation (Artifact Evaluation Co-chair)	PLDI 2019
Live Programming Workshop (Co-organizer)	LIVE 2018
International Conference on Functional Programming (Student Research Competition Chair)	ICFP 2018
Programming Language Design and Implementation (Artifact Evaluation Co-chair)	PLDI 2018
Midwest PL Summit (Co-organizer)	MWPLS 2016

Editorial Boards

Journal of Functional Programming	JFP 2020 – present
-----------------------------------	--------------------

Program Committees

Workshop on Human Aspects of Types and Reasoning Assistants	HATRA 2023
Symposium on Visual Languages and Human Centric-Computing	VL/HCC 2023
Symposium on SPLASH-E (roughly “SE/PL + Education”)	SPLASH-E 2022
Workshop on Human Aspects of Types and Reasoning Assistants	HATRA 2022
Workshop on Bidirectional Transformations	Bx 2022
Workshop on Functional Programming Environments	FPE 2020
Workshop on Evaluation and Usability of Programming Languages and Tools	PLATEAU 2021
Workshop on Bidirectional Transformations	Bx 2020 2021
Programming Language Design and Implementation	PLDI 2021
Art, Science, and Engineering of Programming	<Programming> 2021
Principles of Programming Languages	POPL 2021
Live Programming Workshop	LIVE 2020
Workshop on Human Aspects of Types and Reasoning Assistants	HATRA 2020
Onward! Conference	Onward! 2019
Live Programming Workshop	LIVE 2019
Workshop on Bidirectional Transformations	Bx 2019
Art, Science, and Engineering of Programming	<Programming> 2019
Workshop on Evaluation and Usability of Programming Languages and Tools	PLATEAU 2018
Programming Experience Workshop	PX/18
Live Programming Workshop	LIVE 2017
Programming Language Design and Implementation	PLDI 2017
Trends in Functional Programming	TFP 2016
European Conference on Object-Oriented Programming	ECOOP 2016
Script to Program Evolution Workshop	STOP 2015
Principles of Programming Languages	POPL 2015
Object-Oriented Programming Languages, Systems, and Applications	OOPSLA 2014
Foundations of Object-Oriented Languages	FOOL 2013

External Review Committees

Programming Language Design and Implementation	PLDI 2016
Object-Oriented Programming Languages, Systems, and Applications	OOPSLA 2015
Programming Language Design and Implementation	PLDI 2014

Student Research Competition Committees

Principles of Programming Languages	POPL 2016
Programming Language Design and Implementation	PLDI 2015

Artifact Evaluation Committees

Programming Language Design and Implementation	PLDI 2014
--	-----------

Professional Service (continued)

External Reviews

User Interface Software and Technology	UIST 2018, 2019, 2021, 2022, 2023
Human Factors in Computing	CHI 2020, 2021, 2023
Conference and Exhibition on Computer Graphics and Interactive Techniques in Asia	SIGGRAPH ASIA 2019
Principles of Programming Languages	POPL 2014, 2016
Object-Oriented Programming Languages, Systems, and Applications	OOPSLA 2011, 2022
European Symposium on Programming	ESOP 2011
Compiler Construction	CC 2009

Journal Article Reviews

Transactions on Programming Languages and Systems	TOPLAS 2013, 2014, 2019
Transactions on Computational Logic	TOCL 2019
New Generation Computing	2015

Grant Proposal Panels and Reviews

National Science Foundation	2015, 2017, 2019, 2020, 2021
-----------------------------	------------------------------

Board Memberships

Elm Software Foundation	2017 – present
-------------------------	----------------

Talk Selection Committees

Elm in the Spring Conference	2019
Elm Conference	elm-conf 2018

Examination Reviews


Visiting Fellowship in Assessment for AP CS Principles, College Board	2022
---	------

University Service

Doctoral Thesis Committees

Andrew McNutt		2023
Lefan Zhang	Advisor: Shan Lu	2022
Brian Hempel		2022
Junwen Yang	Advisor: Shan Lu	2021
Kavon Farvardin	Advisor: John Reppy	2020
Yuxi Chen	Advisor: Shan Lu	2019
Mikaël Mayer (EPFL)	Advisor: Viktor Kunčák	2017
Tanakorn Leesatapornwongsa	Advisor: Haryadi Gunawi	2017
Lamont Samuels	Advisor: John Reppy	2016

Master's Paper Committees

Adrian Lehmann	Advisor: John Reppy	2023
Camille Gobert (Paris-Saclay Univ.)	Advisor: Michel Beaudouin-Lafon	 2022
Nick Collins		2020
Valerie Zhao	Advisor: Blase Ur	2020
Chi Li	Advisor: Shan Lu	2019
Nathan Mull	Advisor: Stuart Kurtz	2019
Arthur Vale	Advisor: Stuart Kurtz	2019
Lefan Zhang	Advisor: Shan Lu	2019
Brian Hempel		2018
Bowen Wang		2018
Junwen Yang	Advisor: Shan Lu	2018
Guangpu Li	Advisor: Shan Lu	2017
Joe Wingerter	Advisor: John Reppy	2017
Kavon Farvardin	Advisor: John Reppy	2017
Austin Byers	Advisor: Ari Feldman	2016
Tanakorn Leesatapornwongsa	Advisor: Haryadi Gunawi	2014

Bachelor's Thesis Advisees

Justin Lubin		2020
Grace Lu		2017
Izaak Meckler		2015

MPCS Practicum Committees

Jyotsna Rajaraman	Advisor: Diana Franklin	2023
Mayank Mandava		2015

Computer Science Department


Director of Undergraduate Studies	2023 – present
Executive Committee	2023 – present
Academic Programs Committee	2023 – present
Placement Exams Committee	2023 – present
Undergraduate Matters Committee	2020 – present
Bx Thesis Program Director	2022 – 2023
External Relations Committee	2017 – 2018

University Committees

College Council	2023 – 2024
-----------------	-------------

University Award and Nomination Committees

Google PhD Fellowship Program	2022
Liew Family College Research Fellows	2017

 mi-parcours (mid-term exam)

Academic Honors

National Science Foundation <i>CAREER Award</i>	2017
University of Chicago <i>Neubauer Faculty Fellowship (undergraduate teaching award)</i>	2015

Grants

University of Chicago , College Innovation Fund <i>Enhancing the Programming Environment and Curriculum for CMSC 22300 with Code Style Sheets</i>	2024 \$18,500
University of Chicago , College Innovation Fund <i>Enhancing the Programming Tools and Curriculum for CMSC 11111: Creative Coding</i>	2021 – 2023 \$40,000
National Science Foundation , Award 2011353 <i>I-Corps: Software Platform to Bridge the Gap Between Code Editors and Visual Editors</i> Project led by Mikaël Mayer and Aseem Bhardwaj	2020 – 2021 \$50,000
National Science Foundation , Award 1814900 <i>SHF: Small: Collaborative Research: Semantic Foundations for Hole-Driven Development</i> Project led by Cyrus Omar (Univ. of Michigan); Co-PI: Ben Shapiro (Univ. of Colorado, Boulder)	2018 – 2021 ~\$250,000 / ~\$500,000
National Science Foundation , Award 1651794 <i>CAREER: Direct Manipulation Programming Systems</i>	2017 – 2022 ~\$525,000
National Science Foundation , Award 1654961 <i>Midwest Programming Languages Summit 2016</i>	2016 \$5,000
University of Chicago <i>College Research Fellows Grant</i>	2015 \$3,000